

XLV.—On the African Shrews belonging to the Genus
Crocidura.—V. By GUY DOLLMAN.

[Continued from p. 146.]

Group 11 (*nigricans*).

Size medium. Colour above greyish or dark blackish brown.
Second upper unicuspid rather broader than third.

(64) *Crocidura boydi*, sp. n.

Allied to *arethusa* and *nigricans*, but distinguished by its skull, which has a much shorter and blunter muzzle and considerably shorter tooth-row.

Size rather smaller, hind foot only 11 mm. in length.

Colour of upper parts greyish brown ("mouse-grey" mixed with "mummy-brown"), the grey hair-bases rather less conspicuous. Underparts whitish, strongly contrasting with the brownish grey of the flanks. Backs of hands and feet whitish. Tail short, rather coarsely haired, brown above, dirty buff below; bristle-hairs numerous, evenly distributed throughout the entire length of the tail, white in colour.

Skull with very short broad muzzle, much shorter than in *arethusa*. Small upper unicuspid crushed together, the second appearing a trifle broader than the third and its cusp longer.

Dimensions of the type (measured in the flesh):—

Head and body 80 mm. (stretched); tail 38; hind foot 11; ear 6.

Skull (brain-case broken): least interorbital breadth 4·5; length of palate 8·6; greatest maxillary breadth 7·8; length of upper tooth-row 9.

Hab. Titebbi, Welle River.

Type. Adult female. B.M. no. 7. 7. 8. 52. Original number 103. Collected on June 19th, 1906, by the late Captain Boyd Alexander during the Alexander-Gosling Expedition.

The smaller hind feet, shorter tail, and much shorter muzzle and tooth-row distinguish this Welle River species from the Nigerian *arethusa*. The unicuspid are more as in *nigricans*, the second being rather larger than the third; on this account it has been thought best to place this Welle River species between the *arethusa* group and *nigricans*.

(65) *Crocidura nigricans*, Boc.

Crocidura nigricans, Bocage, Journ. Sc. Lisb. i. p. 29 (1889).

Probably allied to the Welle River species described above and to *nigrofusca* from the Semliki District.

The colour is as follows :—"Pelage en dessus d'un noir-bleu d'ardoise uniforme, en dessous plus pâle ; les poils d'un cendré de plomb à la base ; la queue noirâtre en dessus, brunâtre en dessous."

The second upper unicuspid ("i³") is stated to be larger than the third or canine, which is a little longer than the anterior cusp of the large premolar.

Dimensions of the type (as given by Bocage) :—

Head and body 70 mm. ; tail 52 ; hind foot 12.

Hab. Quindumbo, Angola.

Type. In Lisbon Museum.

In general dental characters this species would appear to agree with *nigrofusca* and to a certain extent with the preceding species ; but the general dimensions and colour are very different, *nigrofusca* being considerably browner and having a larger hind foot and longer tail, while the Welle River species is considerably paler in colour and with a much shorter tail.

(66) *Crocidura nigrofusca*, Matsch.

Crocidura nigrofusca, Matschie, Säug. Deutsch. Ost-Africa, p. 33 (1895).

About equal in size to *turba*, but with a much longer tail and having the second upper unicuspid larger than the third.

Colour above dark blackish brown, the new pelage near "blackish brown (1)" mixed with "mummy-brown," and the worn coat about as in "mummy-brown." Flanks a trifle paler, the tint merging gradually into the dull brownish grey of the belly. Backs of hands and feet dark brown. Tail long, dark brown above and below ; bristle-hairs confined to basal half, not very conspicuous.

Skull much as in *turba*, but with the second upper unicuspid larger than the third. There seems to be some error in Matschie's description of the unicuspid, probably due to a different understanding of the dental nomenclature ; he writes, "*i*₃ und *pm*₄ im Oberkiefer sind ungefähr gleich breit, aber *i*₃ ist fast doppelt so gross wie *c* und der vordere Hocker von *pm*₄ ist wenig kleiner als *c*." I have accepted three specimens from the Upper Congo as representing

Matschie's species; they agree with the description very closely as regards general dimensions and colour, and have the second upper unicuspid rather larger than the third, but otherwise the teeth are quite normal.

Dimensions of the type (as given by Matschie):—

Head and body 65 mm.; tail 68; hind foot 16; ear 9.9.

Dimensions of three specimens from the Upper Congo (measured in the flesh):—

	Head and body.	Tail.	Hind foot.	Ear.
	mm.	mm.	mm.	mm.
♂	78	67	15	10.5
♂	74	65	15	10
♀	77	63	15	10.5

Hab. Wukalala Camp, Kinyawanga, west of Semliki.

Type. In Berlin Museum.

This species is distinguished from the allied forms by its dark blackish-brown colour and long dark-coloured tail.

Group 12 (*luna*).

Size medium. Colour above pale or slaty grey washed with cinnamon or brownish. Skull with anterior corners square-shaped. Second and third upper unicuspid about equal in size.

(67) *Crocidura luna*, Dollm.

Crocidura luna, Dollman, Ann. & Mag. Nat. Hist. (8) vol. v. p. 175 (1910).

Size about as in *turba*, but pale smoke-grey in colour and with a squarer brain-case.

Size of body and hind foot about as in *turba*; tail longer.

General colour of upper parts pale smoke-grey ("deep mouse-grey," finely speckled with "snuff-brown"), rather browner on the back and paler on the flanks, strikingly different from the dark sepia-coloured pelage of *turba*. Underparts slaty grey washed with silvery white; hairs of belly with slate-grey bases and white tips. Backs of hands and feet thinly covered with greyish-white hairs. Tail fairly long, general appearance much less hairy than in *turba*, greyish white above and below; caudal bristle-hairs fairly numerous.

Skull longer than in *fumosa*, as strongly built as in *turba*; anterior angles of brain-case sharply pointed, not rounded, giving the cranial region a square appearance; in size the brain-case is about as in *hindei*, rather flat, considerably more so than in *turba*. Teeth intermediate between those

of the *fumosa* and *turba* groups, the second upper unicuspid rather smaller than the third, not so markedly as in *fumosa*, but rather more so than in *turba*. Last molar as large as in *fumosa*. In general form this skull is like that of *monax* and the allied species *ultima*, the square-shaped brain-case being common to both groups, although not present in all the species of the *dolichura* group.

Dimensions of the type and two topotypes (measured in the flesh) :—

	Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.
♂ (type)	88	60	15	12
♂	86	57	15.5	10
♀	77	55	14	11.5

Skull-dimensions :—

	♂. Type. mm.	♂. Katanga. mm.	♀. Katanga. mm.	♀. S. Rhodesia. mm.
Condyllo-incisive length ..	24.3	23.8	23.8	23.5
Greatest breadth	10.5	10.7	10.6	10.5
Least interorbital breadth ..	5.2	5.2	5.2	5
Length of palate	10.4	10	10.2	9.7
Postpalatal length	10.7	10.6	10.5	10.3
Greatest maxillary breadth .	7.5	7.7	7.7	7.3
Median depth of brain-case .	6	6	6	5.9
Length of upper tooth-row .	11	10.8	11	10.8

Hab. Bunkeya River, Katanga, S. Congo. Altitude 3400 feet.

Type. Adult male. B.M. no. 9.1.3.3.

In addition to the specimens mentioned above, there are in the Collection two more from the Melssetter District, S.W. Rhodesia, which agree very closely with the type in general colour and cranial characters.

(68) *Crocidura luna umbrosa*, subsp. n.

A brown-coloured race of *luna*.

Size about as in the Katanga species.

General colour very much darker and browner, more as in the *fumosa* group, but greyer; colour of back about as in "deep mouse-grey" washed with "mummy-brown"; the grey tint of *luna* here restricted to the grey speckling. Underparts rather darker, slate-grey, hair-tips tinged with buff, not silvery. Backs of hands and feet brownish, considerably darker than in *luna*. Tail very much darker in colour, dark blackish brown above, a shade paler below.

Skull like that of *luna*, with square-shaped, sharp-angled

brain-case, but rather narrower, both across cranial and maxillary regions. Teeth smaller.

Dimensions of the type (taken from dry skin) :—

Head and body 88 mm.; tail 50; hind foot 14.

Skull-dimensions of type and two paratypes :—

	♀. Type. mm.	♂. Paratype. mm.	♀. Paratype. mm.
Condyllo-incisive length	23·5	23	22·8
Greatest breadth	10·3	10	10
Least interorbital breadth	4·8	4·8	4·9
Length of palate	9·9	9·7	9·5
Postpalatal length	10·3	10·2	10·2
Greatest maxillary breadth	7·3	7	7·2
Median depth of brain-case	5·6	5·6	5·6
Length of upper tooth-row	10·5	10·5	10·3

Hab. Machakos, British East Africa. Altitude 5400 feet.

Type. Adult female. B.M. no. 1. 12. 9. 3. Original number 94. Collected and presented by Dr. S. L. Hinde.

The browner colour, darker extremities and tail, and narrower skull distinguish this Machakos race from the true *luna*.

(69) *Crocidura luna macmillani*, subsp. n.

A dark slate-grey form.

Size of body and hind foot about as in *luna*, tail rather shorter.

Colour darker throughout, upper parts dark slate washed with vandyke-brown ("deep mouse-grey," mixed with "fuscous"), flanks rather greyer, the tint gradually merging into the pure slate-coloured underparts ("deep neutral grey"), general effect considerably darker than in *luna*. Backs of hands and feet dirty white. Tail rather shorter, but as pale in colour as that of the Katanga form.

Skull considerably narrower than in *luna*, more as in *umbrosa*, but with rather smaller brain-case. General build of cranial region the same as in *luna*, anterior angles of brain-case quite as sharp, not rounded. Maxillary region rather narrow. Teeth smaller, especially the second and third upper unicuspid, third about as in *umbrosa*, second rather smaller.

Dimensions of the type (measured in the flesh) :—

Head and body 87 mm.; tail 52; hind foot 14; ear 9.

Skull: condyllo-incisive length 22·9; greatest breadth 10; least interorbital breadth 4·8; length of palate 9·5; post-

palatal length 10·1 ; greatest maxillary breadth 7·2 ; median depth of brain-case 5·6 ; length of upper tooth-row 10·2.

Hab. Kotelee, Walamo, Abyssinia.

Type. Adult female. B.M. no. 6. 11. 1. 13. Original number 148. Collected by P. Zaphiro on September 9th, 1905, and presented by W. N. McMillan, Esq.

The darker colour and narrower skull distinguish this form from the *Katanga luna*. The Machakos race cannot be confused with this Abyssinian form, the hands, feet, and tail being very much darker and the general colour browner and less slaty in *umbrosa*.

(70) *Crocidura ibeana*, sp. n.

Smaller than *luna* and more cinnamon-coloured.

Size of body and hind foot much smaller than in *luna* or the allied forms ; hind foot only 12 mm. in length.

Colour of upper parts light cinnamon-brown ("pale snuff-brown" mixed with "drab," speckled with "mouse-grey"), very much as in dull specimens of *hindei*. Flanks greyer, the cinnamon tint gradually fading away and replaced on the ventral surface by light grey, much less slaty than in *luna* or *macmillani*. Backs of hands and feet dirty white. Tail fairly long, caudal bristle-hairs short and inconspicuous ; colour above reddish brown, whitish below.

Skull considerably smaller than in *luna*, with much smaller teeth ; anterior angles of cranium quite as square.

Dimensions of the type (measured in the flesh) :—

Head and body 74 ; tail 47 ; hind foot 12 ; ear 10·5.

Skull : condylo-incisive length 20 ; greatest breadth 9·4 ; least interorbital breadth 4·5 ; length of palate 8 ; post-palatal length 9 ; greatest maxillary breadth 6·2 ; median depth of brain-case 4·7 ; length of upper tooth-row 8·5.

Hab. Olgerei River, British East Africa.

Type. Adult male. B.M. no. 12. 7. 1. 68. Original number 114. Collected and presented by A. Blayney Percival, Esq.

The much smaller size and cinnamon-brown colour separate this form very clearly from the other members of the *luna* group.

Group 13 (*argentata*).

Rather small-sized species. Colour above greyish or greyish brown.

Second and third upper unicuspid about equal in size.

(71) *Crocidura argentata*, Sund.

Sorex argentatus, Sundevall, K. Vetensk.-Ak. Handl. ii. no. 10, p. 16 (1858).

Size less than in *luna*.

Colour of upper parts pale slaty grey washed with reddish brown ("neutral grey" speckled with "cinnamon-drab"); hairs of back with slaty bases, reddish-brown tips, and light grey subterminal rings, the reddish tips becoming more dominant in the worn pelage, but never to such a marked extent as in *hirta*. Flanks rather greyer, the colour merging gradually into the purer and lighter grey of the under surface; belly "neutral grey" washed with "snuff-brown." Backs of hands and feet dirty white or pale brown. Tail dark brown above, dirty white below; bristle-hairs not very numerous or conspicuous, evenly distributed over basal two-thirds.

Skull much smaller than that of *luna* or *electa*, rather shorter than in *martensi*, the junction of the lambdoidal and sagittal sutures fairly far forwards as in the *fumosa* group, brain-case broad and flat; interorbital region broad posteriorly. Tooth-row a little shorter than in *martensi*; second and third upper unicuspid about equal.

Dimensions of the type (as given by Sundevall):—

Head and body 75 mm.; tail 45; hind foot (c. u.) 13·5.

Dimensions of a series from Deelfontein:—

	Head and body. mm.	Tail. mm.	Hind foot. mm.
♂	85	52	13
♂	77	52	12·5
♂	78	48	12·5
♀	73	48	12·5
♀	95	51	12·5

Skulls:—

	♂. mm.	♂. mm.	♂. mm.	♂. mm.	♀. mm.	♀. mm.
Condyllo-incisive length	22·3	22·2	21·4	21·5	21·4	21
Greatest breadth	9·6	9·7	9·3	9·5	9·5	9·5
Least interorbital breadth ..	4·6	4·7	4·7	4·5	4·2	4·4
Length of palate	9·3	9·1	8·7	8·7	8·7	8·7
Postpalatal length	9·8	10·3	9·4	9·4	9·4	9·2
Greatest maxillary breadth ..	6·8	6·8	6·6	6·5	6·4	6·3
Median depth of brain-case ..	4·8	5	4·7	4·8	4·8	4·6
Length of upper tooth-row ..	9·4	9·3	9·1	9·1	9·1	8·9

Hab. Roodeval, Karroo.

The slaty-brown colouring and shorter skull distinguish this shrew from *martensi*; both *electa* and *luna*, which are rather similar in colour to *argentata*, are both larger and possess larger and heavier skulls.

(72) *Crocidura cyanea*, Duv.

Sorex cyaneus, Duvernoy, Mém. Soc. Hist. Nat. Strasb. ii. Supp. p. 2 (1838); Mag. Zool. p. 21, pls. xl. & xli. (1842).

A dark slate-grey coloured species, probably allied to *argentatus*.

The description and plate given by Duvernoy show that the colour is considerably more slaty and less rufous than in *argentata*; it is possible that the specimen was immature and in the slate-coloured pelage so often met with in young individuals. The coloured plate is too "artistic" to be of very much use, but it was evidently intended to represent a slate-grey shrew, such as is described by Duvernoy. Underparts rather paler than upper, but not markedly so. Backs of hands and feet dirty buff. Tail slender, not conspicuously paler on the ventral surface, bristle-hairs fairly numerous, evenly distributed throughout nearly the whole length of the tail.

Skull apparently much as in *argentata*.

Dimensions (as given by Duvernoy):—

"Le corps a 3 pouces 4 lignes de long et la queue 2 pouces."

Hab. "... la rivière des Éléphants, au sud de l'Afrique."

The dark slaty colour readily distinguishes this shrew from *argentata*, which is considerably paler and washed with reddish brown.

(73) *Crocidura electa*, Dollm.

Crocidura electa, Dollman, Ann. & Mag. Nat. Hist. (8) vol. v. p. 175 (1910).

Allied to *argentata*, larger in size and darker in colour.

Hind foot considerably longer, measuring from 13 to 14.5 mm. in length.

Colour of dorsal surface darker and browner deep,,) mouse-grey" speckled with "clove-brown"), very much as in *luna*. Ventral surface more slaty; extremities and tail as in *argentata*.

Skull larger than that of *argentata*, brain-case higher; teeth all larger, third upper unicuspid a trifle broader than second. Last upper molar large. In general shape the skull more resembles that of *luna*, but is rather smaller and has not the square-angled brain-case so characteristic of *luna* and its allies.

Dimensions of the type (measured in the flesh) :—

Head and body 78 mm.; tail 47; hind foot 13·5; ear 10.

Skull: condylo-incisive length 23·3; greatest breadth 10·3; least interorbital breadth 4·8; length of palate 9·9; postpalatal length 10·6; greatest maxillary breadth 7·2; median depth of brain-case 5·9; length of upper tooth-row 10·6.

Hab. Kamtoby, south of Lake Tanganyika. Altitude 4500 feet.

Type. Adult male. B.M. no. 9.12.4.15.

The darker colouring and larger skull and teeth readily distinguish this Tanganyika shrew from the South African *argentata*. Its near neighbour, *luna*, is considerably larger with longer tail, and possesses a larger skull with square-shaped brain-case and larger teeth.

(74) *Crocidura martensi*, Dobs.

Crocidura martensii, Dobson, Ann. & Mag. Nat. Hist. (6) vol. vi. p. 496 (1890).

Size medium small. Fur fairly long, hairs of back measuring 5–6 mm. in length. Colour above brown finely speckled with grey ("light greyish olive" washed with "Prout's brown"), the tint fading gradually on the flanks into the grey of the ventral surface. Backs of hands and feet brownish yellow. Tail fairly long and finely haired, brown above, whitish below; bristle-hairs not numerous, sparingly distributed over basal two-thirds, greyish in colour.

Skull rather long and narrow, not so flattened as in *argentata*; third upper unicuspid rather longer in transverse section than second.

Dimensions of the type (as given by Dobson) :—

Head and body 75 mm.; tail 58; hind foot 13; ear 9.

Dimensions of three Zululand specimens which appear to belong to this species :—

	Head and body. mm.	Tail. mm.	Hind foot. mm.
♂. Zululand	80	64	15
♂. "	81	60	14
♀. "	85	59	14

Skulls (♂ and ♀): condylo-incisive length 22·1, 22; greatest breadth 9·7, 9·7; least interorbital breadth 4·7, 4·7;

length of palate 9·4, 9·4; postpalatal length 9·7, 9·9; greatest maxillary breadth 7, 6·8; median depth of brain-case 5·2, 5·5; length of upper tooth-row 9·8, 9·6.

Hab. "Cape of Good Hope."

This species is distinguished from *argentata* by its longer tail, longer, narrower, and less flattened skull, and browner colour. From the following form *silacea*, *martensi* is distinguished by its larger size, longer fur and tail, and browner colour.

(75) *Crocidura silacea*, Thos.

Crocidura silacea, Thomas, Ann. & Mag. Nat. Hist. (6) vol. xvi. p. 53 (1895).

Allied to *pilosa*, but distinguished by its shorter fur, paler colour, and less hairy tail.

Size of body as in *pilosa*. Fur considerably shorter, hairs on back only 3–4·5 mm. in length; ears less hairy.

Colour above pale slaty grey, between "mouse-grey" and "hair-brown." Ventral surface rather paler and greyer. Backs of hands and feet pale brownish buff. Tail not so hairy as in *pilosa*, covered with very fine short hairs, brownish above, paler below; bristle-hairs less numerous and more evenly distributed, occurring along the tail to within 10 mm. of the tip, greyish in colour.

Skull a little smaller than that of *pilosa*, with slightly smaller teeth.

Dimensions of the type (in spirit) and three other specimens (measured in the flesh):—

	Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.
♀ (type)	65	44	12	9
♂. Zoutpansberg ..	72	55	12	..
♂. " ..	69	43	13·5	..
♂. Barberton Dist. .	76	56	12	..

Skull of topotype: condylo-incisive length 19·4; greatest breadth 8·8, least interorbital breadth 4; length of palate 7·8; postpalatal length 8·7; greatest maxillary breadth 6; median depth of brain-case 4·6; length of upper tooth-row 8·2.

Hab. Figtree Creek, De Kaap, Transvaal.

Type. Adult female. B.M. no. 93.11.26.29.

This species differs from *pilosa* in its shorter fur, paler colour, and less hairy tail.

(76) *Crocidura bovei*, Dobs.

Crocidura bovei, Dobson, Ann. Mus. St. Nat. Genova, v. p. 425 (1887).

Colour above light brown with a greyish tinge on the surface; below silvery grey slightly intermixed with brown. Backs of hands and feet and tail covered with short pale-coloured hairs, lower surface of tail whitish.

Skull about equal in length to that of *floweri*, larger than in *bicolor*; second and third upper unicuspid about equal, tooth-row rather short.

Dimensions of the type (as given by Dobson):—

Head and body 58 mm.; tail 47; hind foot 12; ear 8·5.

Skull: condylo-incisive length 18·5; greatest breadth 8; length of upper tooth-row 7·5.

Hab. Vivi, Lower Congo.

Type. Adult male. Museo Civico, Genoa.

It is probable that *bovei* is more closely allied to *silacea* than to the *bicolor* group.

(77) *Crocidura capensoides*, Smith.

Sorex capensoides, Smith, S. Afr. Quart. Journ. vol. ii. p. 62 (1833).

Size fairly small, probably allied to *silacea*.

Fur described as "moderately long"; in the type-specimen, now before me, the hairs on the back are 4–5 mm. in length. Unfortunately the type is very faded; the colour above is brownish grey finely speckled with greyish. Ventral surface paler and greyer, the transition from the darker dorsal coloration rather gradual. Backs of hands and feet pale brown. Tail finely haired, brownish above, paler below; bristle-hairs distributed over basal two-thirds, whitish in colour.

Skull badly broken, only the nasal and maxillary regions remaining intact. Teeth fairly large, larger than in the *bicolor* group, second and third upper unicuspid about equal.

Dimensions of the type (as given by Smith):—

Head and body 3 inches; tail (now broken) $1\frac{3}{4}$ inches.

The hind foot measures 10·7 mm. in length.

Skull: least interorbital breadth 4·2; length of palate 8; greatest maxillary breadth 5·7; length of upper tooth-row 8·5.

Hab. Near Cape Town.

Type. Adult. B.M. no. 45. 7. 3. 38.

Group 14 (*pilosa*).

Size medium small. Colour dark brown; fur very long; extremities and tail clothed with short, coarse, black hairs. Second and third upper unicuspid about equal in size.

(78) *Crocidura pilosa*, Dobs.

Crocidura pilosa, Dobson, Ann. & Mag. Nat. Hist. (6) vol. vi. p. 496 (1890).

A dark brown, medium small-sized species, with hairy tail. Fur long, hairs on back measuring from 6 to 7 mm. in length.

Colour (from spirit-specimens) dark brown, slightly paler below. Backs of hands and feet blackish brown. Tail thickly covered with short, coarse, brownish-black hairs, rather paler on the lower side; bristle-hairs slender and numerous, densely packed together over basal two-thirds, brown in colour.

Skull smaller than that of *martensi* or *argentata*, with smaller teeth.

Dimensions of the type (as given by Dobson):—

Head and body 60 mm.; tail 48; hind foot 13·5; ear 7·5.

Skull: length 20; greatest breadth 9; length of upper tooth-row 8.

Dimensions of two spirit-specimens in the Museum Collection:—

	Head and body.	Tail.	Hind foot.	Ear.
	mm.	mm.	mm.	mm.
♂. Transvaal.....	59	46	13·5	7·5
♀. „	69	50	14·3	7·7

Skulls (broken): least interorbital breadth 4, 4·2; length of palate 8, 8·5; greatest maxillary breadth 5·8, 5·9; length of upper tooth-row 8·5, 8·9.

Hab. Transvaal.

The chief distinguishing characters of this species are the long fur, the dark brown colouring, and the short, blackish, coarse hairs on the tail.

Group 15 (*fumosa*).

Size medium. Colour above dark brown, grey, or blackish.

Third upper unicuspid broader than second.

(79) *Crocidura fumosa*, Thos.

Crocidura fumosa, Thomas, Ann. & Mag. Nat. Hist. (7) vol. xiv. p. 238 (1904).

Rather smaller than *turba*, with flatter, more delicately built skull.

Size of body rather small, between 73 and 84 mm. in length.

General colour of dorsal surface dark smoky brown (between "fuscous" and "sepia") mottled all over with greyish buff; the colour varies slightly according to the pelage, the type and topotypes in the Collection are evidently in the more bleached pelage, the colour being rather redder than in a series from the Aberdare Mountains, in which the specimens are all rather less red. Ventral surface a little paler, hairs dark slate-grey, with greyish-brown or vandyke-brown tips. Lateral gland small and usually inconspicuous. Flanks as dark as back, the colour gradually merging into the dark greyish-brown tint of the belly. Backs of hands and feet brownish or dirty white. Tail rather long, cylindrical, well provided with bristle-hairs; dark brown above, a shade lighter below.

Skull very delicately built, the general appearance much less solid than is usually the case in species of this size, rather short and with broad, flat, smooth brain-case, the greatest breadth of which is formed by a lateral angular expansion of its sides. In *turba* the sides of the brain-case do not present this angular expansion. Sagittal and lambdoidal sutures never forming any marked crests, their median junction more anterior than in *turba*. Maxillary region narrow, palate rather short. Teeth small, second upper unicuspid considerably smaller than third and slightly overlapped by it.

Dimensions of type, topotypes, and specimens from other localities :—

	Head and body.	Tail.	Hind foot.
	mm.	mm.	mm.
♂ (type). Kenya	82	57	15
♂. Kenya	86	62	15.5
♀. "	90	55	15
♂. Mt. Elgon	76	54	15
♂. "	76	56	14
♀. "	77	52	14.5
♀. "	72	63	15
♀. "	73	53	15
♀. Jombeni Range	82	59	15
♂. Aberdare Mts.	84	56	14
♂. " "	83	53	15.5
♂. " "	84	52	15
♀. " "	84	52	14.5
♀. " "	81	52	14.5
♀. " "	84	58	14
♀. " "	81	53	15.5

Skull-dimensions of type and seven adults :—

	Mt. Kenya.		Aberdare Mts.				Mt. Elgon.	
	♂ (type).	♂.	♂.	♂.	♀.	♀.	♀.	♀.
Condyllo-incisive length ..	22	21.5	21.5	21.4	21.6	21	21.8	21
Greatest breadth	10.1	10.4	10.1	9.9	10.1	9.8	10.2	9.9
Least interorbital breadth.	4.9	5	4.9	4.8	4.9	4.9	4.7	4.6
Length of palate	8.6	8	8.6	8.6	8.4	8.3	8.8	8.3
Postpalatal length	9.7	9.3	10	9.2	9.7	9.6	9.7	9.1
Greatest maxillary breadth.	6.7	6.3	6.5	6.3	6.3	6.2	6.8	6.2
Length of upper tooth-row.	9.4	9.3	9.3	9.1	9	9	9.5	9

The examination of a large series of specimens from various localities in British East Africa shows that this species, while exhibiting a certain amount of individual variation in size, cannot be split up into geographical races to the same extent as in the *turba* group. There does not appear to be any sexual variation at all.

Hab. Western slope of Mt. Kenya. Altitude 7800 feet.

Type. Adult male. B.M. no. O.2.1.8.

This Kenya species is represented in the Museum Collection by a small series from the type-locality, a large number of specimens from the Aberdare Mountains, a few from Mt. Elgon, and a single specimen from the Jombeni Range (Nyeri District), British East Africa.

The curiously delicately built smooth skull and respective sizes of the upper unicuspid render this species quite distinct.

(80) *Crocidura fumosa montis*, Thos.

Crocidura fumosa montis, Thomas, Ann. & Mag. Nat. Hist. (7) vol. xviii. p. 138 (1906).

Size as in *fumosa*, but darker in colour and with more solidly built skull.

Fur rather longer than in the Kenya species. General colour dark slate-grey ("fuscous black" mixed with "black"), much less brown than in *fumosa*, and minutely speckled with silvery grey. Ventral surface very dark, slate-grey washed with vandyke-brown. Backs of hands and feet dirty brown. Tail long and slender, dark brown above, lighter below.

Skull like that of *fumosa*, but with a rather higher brain-case and narrower upper unicuspid.

Dimensions of the type and four topotypes (measured in the flesh):—

	Head and body. mm.	Tail. mm.	Hind foot. mm.
♀ (type)	77	61	15
♀	86	60	15
♀	76	..	15
♂	80	59	15.5
♂	83	64	14.5

Skull of type: condylo-incisive length 21.7; greatest breadth 10.1; least interorbital breadth 5.3; length of palate 9; postpalatal length 9.7; greatest maxillary breadth 6.8; median depth of brain-case 6.3; length of upper tooth-row 9.6.

Hab. Ruwenzori East. Altitude 7000-12,500 feet.

Type. Adult female. B.M. no. 6. 7. 1. 28.

There is a certain amount of colour-variation exhibited by this species; in some cases the fur is nearly pure black, with the ventral surface scarcely paler; in the type and two other specimens the tint is considerably lighter and greyer, a condition which may be due to either age or seasonal change.

(81) *Crocidura fumosa schistacea*, Osg.

Crocidura fumosa schistacea, Osgood, Field Mus. Nat. Hist., Publication 143 (Zool. Ser.), vol. x. no. 3, p. 20 (1910).

In size equal to *fumosa*, but paler and less brown in colour.

Upper parts dark mouse-grey with light silvery ticking; ventral surface considerably paler than in *fumosa*. Backs of hands and feet paler. Tail more distinctly bicolor.

Dimensions of type (as given by Osgood):—

Head and body 93 mm.; tail 52; hind foot (c. u.) 15.

Skull: condylo-incisive length 23.1; greatest breadth 10.1; postpalatal length 10.6; length of upper tooth-row 10.2.

Hab. Lukenya Mountains (Ulu Kenya Hills), British East Africa.

Type. Adult female. Field Mus. Nat. Hist. no. 16884.

The greyer colour and rather larger skull separate this race from the true *fumosa*.

(82) *Crocidura fumosa selina*, subsp. n.

Size about as in *fumosa*.

Fur not very long, hairs of back about 5 mm. in length.

Colour (from spirit-specimen) very much the same as in true *fumosa*, dark slate-grey washed over with sepia and speckled with pale buff, browner than in *raineyi*. Ventral surface greyer, less brown, but not very much paler than upper parts. Lateral gland marked by a streak of short brownish hairs. Backs of hands and feet brown. Tail as in *fumosa*.

Skull with broad maxillary region. Teeth all larger and heavier, third upper unicuspid exceptionally large, considerably broader than in *fumosa*, oval in section, and much larger than the second.

Dimensions of the type (in spirit):—

Head and body 86 mm.; tail 58; hind foot 15; ear 10.

Skull (broken): length of palate 10; greatest maxillary breadth 7.5; length of upper tooth-row 10.5; horizontal dimensions of third upper unicuspid—length 1.3, breadth 1.

Hab. Mabira Forest, Chagwe, Uganda.

Type. Adult male. B.M. no. 8. 10. 27. 3.

The much greater size of the third upper unicuspid immediately separate this form from *fumosa*.

(83) *Crocidura fumosa johnstoni*, subsp. n.

Closely related to the Uganda race described above, the third upper unicuspid nearly as broad, more rounded in shape.

Size rather larger than in *fumosa*, but not to any marked extent. Fur long, hairs of back 8 mm. in length.

Colour (from spirit-specimen) of dorsal surface dark blackish brown, below rather greyer. Hands and feet as in *fumosa*. Tail very similar, a little paler below; bristle-hairs fairly numerous.

Skull larger than that of *fumosa* and more stoutly built; junction of lambdoidal and sagittal sutures almost as far forward. Teeth all much heavier, larger than in *selina*, excepting the second and third upper unicuspid, which are rather smaller, third much larger than in *fumosa*. In this Nyasa shrew the large upper premolar is not in contact with the posterior border of the third unicuspid; in the Uganda race the two teeth just touch one another.

Dimensions of the type (in spirit):—

Head and body 81 mm.; tail 56; hind foot 15.5; ear 10.

Skull: condylo-incisive length 24.7; greatest breadth 10.9; least interorbital breadth 5.2; length of palate 10.2; post-palatal length 11.1; greatest maxillary breadth 7.8; median

depth of brain-case 5·7; length of upper tooth-row 10·9; horizontal dimensions of third upper unicuspid—length 1, breadth ·9.

Hab. Chiromo, Nyasaland.

Type. Adult male. B.M. no. 93. 5. 2. 47. Collected by Mr. A. Whyte and presented by Sir Harry Johnston.

The larger skull and much larger size of the third upper unicuspid separate this Nyasa race from the East-African *fumosa*; the Uganda form, *selina*, has shorter fur, a rather shorter tooth-row, and rather larger upper unicuspid.

(84) *Crocidura raineyi*, Hell.

Crocidura raineyi, Heller, Smith. Misc. Coll. vol. lx. no. 12, p. 7 (1912).

Larger than *fumosa*, with heavier skull, larger teeth, and much paler and greyer in colour.

General colour like a light shade of that seen in *montis* (between “fuscous black” and “*Chætura* drab” mixed with “neutral grey”), the brown tint only faintly developed, much less dominant than in true *fumosa*; silver-grey ticking very conspicuous. Ventral surface slightly lighter, lacking the silver speckling of the upper parts. Backs of hands and feet dirty white. Tail indistinctly bicoloured, light brown above, paler below, caudal bristle-hairs slender and light-coloured.

Skull much more strongly built than in *fumosa*; brain-case shaped as in *luna*, anterior corners square. Teeth larger, the third upper unicuspid broader than the second in transverse section.

Dimensions of the type (as given by Heller):—

Head and body 90 mm.; tail 61; hind foot 15·5.

Skull: condylo-incisive length 23·3; greatest breadth 10·7; length of upper tooth-row 11.

Hab. Mt. Gargues (Mt. Urguess). Altitude 6000 feet.

Type. Adult female. U.S. Nat. Mus. no. 181816.

In the Museum Collection there are two topotypes of this interesting shrew, collected and presented by A. Blayney Percival, Esq. Both these specimens agree with Heller's description very closely. The following are the dimensions (measured in the flesh) of these specimens:—

♀ ♀. Head and body 88, 92 mm.; tail 54, 54; hind foot 15·5, 16.

Skull of one of the Museum specimens:—

Condylo-incisive length 24·5; greatest breadth 10·5; least interorbital breadth 5·4; length of palate 10; post-

palatal length 10·9; greatest maxillary breadth 8; length of upper tooth-row 11.

The pale slate-grey pelage and larger cranial dimensions render this species quite distinct from *fumosa*.

Group 16 (*jacksoni*).

Size fairly small. Colour above greyish or dark brown. Third upper unicuspid broader or almost the same size as second.

(85) *Crocidura parvipes*, Osg.

Crocidura parvipes, Osgood, Field Mus. Nat. Hist., Publication 143 (Zool. Ser.), vol. x. no. 3, p. 19 (1910).

A medium small-sized brownish-fawn coloured species, with whitish underparts and short tail.

Size of body about as in *lutreola*; hind foot small.

Colour above brownish fawn speckled with drab-grey; ventral surface white tinged with creamy, the bases of the hairs slate-grey; line of demarcation between the brown upper parts and the white of the belly sharp. Feet whitish. Tail brownish above, whitish below.

Skull about equal in size to that of *jacksoni amalæ*, larger than in *bicolor*, third upper unicuspid slightly larger than second, but appearing smaller in lateral view, since its posterior third is hidden by the anterior cusp of the large premolar.

Dimensions of the type (as given by Osgood):—

Head and body 84 mm.; tail 38; hind foot 11·5.

Skull: condylo-incisive length 20·7; greatest breadth 9·5; greatest maxillary breadth 7·1; length of upper tooth-row 8·7.

Hab. Voi, British East Africa.

Type. Adult male. Field Mus. Nat. Hist. no. 16890.

In general dimensions this species would appear to be nearest *sansibarica*, but the ventral surface is considerably paler and whiter.

(86) *Crocidura sansibarica*, Neum.

Crocidura bicolor sansibarica, Neumann, Zool. Jahrb. Abth. Syst. vol. vi. p. 544 (1900).

Size of body larger than in *bicolor*.

Colour above brown washed with cinnamon, below greyish brown.

Dimensions of the type (as given by Neumann):—

Head and body 86 mm.; tail 40.

Hab. Mojoni, Zanzibar Island.

This Zanzibar shrew would appear to be considerably larger than *bicolor* and the allied races ; in general body-dimensions it is more as in *parvipes* from Voi ; probably it is more nearly allied to this form than to *bicolor*, and is here treated as a separate species.

(87) *Crocidura xanthippe*, Osg.

Crocidura xanthippe, Osgood, Field Mus. Nat. Hist., Publication 143 (Zool. Ser.), vol. x. no. 3, p. 19 (1910).

Size rather larger than in *jacksoni*.

Colour above "fawn-colour with a fine vermiculation of lighter (almost ecru-drab)"; ventral surface dull greyish white. Backs of hands and feet white. Tail dusky brown above, below whitish for proximal two-thirds, dusky for terminal third.

In the Museum Collection are four specimens, two from Voi and two from Taveta, which I have accepted as representing this species. They are rather darker in colour than Osgood's type, but very similar in dimensions.

Skull rather longer than in *jacksoni*, brain-case larger. Small upper unicuspid almost equal, second a trifle smaller than third.

Dimensions of the type (as given by Osgood) :—

Head and body 90 mm. ; tail 60 ; hind foot 15.

Skull : condylo-incisive length 22 ; maxillary width 6·8 ; length of upper tooth-row 9·6.

Hab. Voi, British East Africa.

Type. Adult male. Field Museum Nat. Hist. no. 16888.

Distinguished from *jacksoni* by its paler and more fawn-coloured pelage.

The original spelling of the specific name is presumably a misprint.

(88) *Crocidura jacksoni*, Thos.

Crocidura jacksoni, Thomas, Ann. & Mag. Nat. Hist. (7) vol. xiv. p. 238 (1904).

Size medium small, hind foot from 12 to 13 mm. in length.

General colour of dorsal surface smoky grey conspicuously mottled with silvery grey, resulting effect represented by "fuscous" mottled with "clove-brown" and silvery grey ; flanks less brown, the tint fading gradually into the lighter grey colour of the ventral surface. Lateral glands not so obvious as in some of the allied species, but marked with a

streak of short whitish hairs. Hands and feet dirty buff. Tail more hairy than in *hildegardæ*, caudal bristle-hairs grey and numerous; above brownish grey, dirty buff or whitish below.

Skull like a small edition of that of *fumosa*, brain-case not quite so broad proportionally; interorbital region thick. Teeth smaller than in *fumosa*; third upper unicuspid a trifle broader in transverse section than second; in the type these two teeth are almost equal in size, the second being triangular in section and the third a trifle longer and heart-shaped.

Dimensions of the type (taken from the dry skin):—

Head and body 73 mm.; tail 51; hind foot (moistened) 13.

The dimensions of the tail and hind foot of three topotypes in the collection are respectively 45, 47, 48 mm.—13.5, 12.5, 12.

Skull of type and two topotypes:—

	♀ (type). mm.	♀ (topotype). mm.	(Topotype). mm.
Condyllo-incisive length.....	21.1	20.7	21
Greatest breadth	9.2	9.1	9
Least interorbital breadth	4.4	4.5	4.5
Length of palate	8.5	8.5	8.5
Postpalatal length	9.6	9	8.9
Greatest maxillary breadth	6.5	6.6	6.5
Median breadth of brain-case	5.3	5.2	5.2
Length of upper tooth-row	9.2	9.2	9.4

Hab. Ravine Station, British East Africa.

Type. Adult female. B.M. no. 99.8.4.27.

(89) *Crocidura jacksoni amalæ*, subsp. n.

Closely allied to *jacksoni*, but distinguished by its darker colour and the entire absence of the silvery-grey mottling so conspicuous in the Ravine form.

Size rather less, hind foot 12 mm. in length.

Colour of dorsal surface dark brownish finely speckled with pale buff, the general effect as in "mummy-brown" mixed with "sepia"; flanks paler, the brownish tint passing more abruptly into the light grey of the ventral surface. Backs of hands and feet a shade darker than in *jacksoni*. Tail equally hairy; distinctly bicoloured, dark brown above, white below.

Skull rather smaller and narrower than in *jacksoni*;

second and third upper unicuspid markedly smaller, third a trifle larger than second; shape of teeth as in *jacksoni*.

Dimensions of the type (measured in the flesh):—

Head and body 68 mm.; tail 47; hind foot 12; ear 10.

Skull: condylo-incisive length 20; greatest breadth 8·7; least interorbital breadth 4; length of palate 8; postpalatal length 9; greatest maxillary breadth 6; median depth of brain-case 5·2; length of upper tooth-row 8·3.

Hab. Amala River, Nyanza Province, British East Africa. Altitude 5500 feet.

Type. Adult male. B.M. no. 13. 10. 18. 24. Original number 50. Collected on October 16th, 1912, by W. P. Lowe, Esq.; presented by G. P. Cosens, Esq.

Mr. Lowe obtained a second specimen of this small shrew at Lengototo, S.W. Nyanza Province; it agrees very closely with the type in general colour and the dental characters noted above.

The browner colour, absence of silver-grey mottling, more distinctly bicoloured tail, and smaller unicuspid are the chief characters that serve to distinguish this new form from the Ravine species.

(90) *Crocidura jacksoni denti*, subsp. n.

About equal in size to *jacksoni*.

Fur of medium length, hairs on back 3–4·5 mm. in length.

Colour (from spirit-specimen) dark brown above, slaty grey below. Backs of hands and feet brownish. Tail dark brown above, slightly paler on the ventral surface; bristle-hairs fairly numerous on basal two-thirds.

Skull about equal in size to that of *jacksoni*, but with a rather larger brain-case, the anterior corners of which are very much more rounded. Small upper unicuspid more equal in size, the third only slightly broader than the second.

Dimensions of the type (in spirit):—

Head and body 63 mm.; tail 46; hind foot 13; ear 8.

Skull: condylo-incisive length 20·6; greatest breadth 9·3; least interorbital breadth 4·5; length of palate 8·5; postpalatal length 9·2; greatest maxillary breadth 6·6; median depth of brain-case 5·1; length of upper tooth-row 9.

Hab. Between Mawambi and Avakubi, Ituri Forest, Congo.

Type. Adult female. B.M. no. 7. 1. 2. 13. Collected during the Ruwenzori Exploration by Mr. R. E. Dent.

This Ituri race is distinguished from *jacksoni* by its darker body-colour, darker extremities and tail, more rounded brain-case.

(91) *Crocidura macowi*, sp. n.

Richer in colour than either *jacksoni* or *lutreola*.

Size of body and hind foot about the same; tail a little longer.

Upper parts dark brown ("mummy-brown" mixed with "raw umber"), the colour passing fairly abruptly into the slate-grey of the belly. Hands and feet rather darker, dirty brown. Tail more hairy than in *lutreola*, about as in *jacksoni*, but longer; dark brown above, a shade paler below.

Skull smaller than in *jacksoni*, about equal to that of *lutreola*, muzzle rather blunt; anterior corners of brain-case about as in *jacksoni*. Second upper unicuspid triangular in transverse section, third rather heavier and squarer in section.

Dimensions of the type (measured in the flesh):—

Head and body 71 mm.; tail 58; hind foot 13·5; ear 9·5.

Skull: condylo-incisive length 19·7; greatest breadth 9; least interorbital breadth 4·6; length of palate 7·8; post-palatal length 9; greatest maxillary breadth 6·2; median depth of brain-case 4·9; length of upper tooth-row 8·3.

Hab. Mt. Nyiro, S. of Lake Rudolf.

Type. Adult male. B.M. no. 12. 7. 1. 65. Original number 393. Collected and presented by A. Blayney Percival, Esq.

In addition to the type Mr. Percival obtained a second specimen of this interesting little shrew at the same locality; it agrees very closely with the type in colour and dimensions (♀. Head and body 68 mm.; tail 57; hind foot 13; ear 8·5).

(92) *Crocidura gracilipes*, Pet.

Crocidura gracilipes, Peters, MB. Akad. Berlin, p. 584 (1870).

Size about as in *jacksoni*, colour browner without the grey mottling, more as in *lutreola*, but with the second and third upper unicuspid about equal in size.

General colour cinnamon-brown (between "mummy-brown" and "fuscous"), with none of the silver-grey mottling so evident in *jacksoni*; flanks slightly paler and greyer than back. Lateral glands small, marked by short whitish hairs. Underparts grey washed with buffish brown,

rather paler and greyer in the new unbleached coat. Backs of hands and feet brownish buff. Tail long and slender, clothed with much shorter and less conspicuous hairs than in *jacksoni* or *j. amalæ*, appearing almost naked except for the bristle-hairs, which are very inconspicuous; colour dark brown above, a shade paler below, very different from the distinctly bicoloured tail of *amalæ*.

Dimensions of the type (as given by Peters):—

Head and body 65 mm.; tail 52; hind foot 13 (c. u.).

Skull: length of upper tooth-row 8·7.

Hab. Kilimanjaro.

In the Museum Collection there are three specimens which appear to represent this species, one from Rombo (Kilimanjaro), and two from Taveta. The dimensions of these individuals are as follows:—

	Head and body. mm.	Tail. mm.	Hind foot. mm.
♀. Kilimanjaro	66	50	12·2
♀. Taveta	74	44	12
♀. „	70	45·5	12

Skulls of Taveta specimens: condylo-incisive length 20, 20; greatest breadth 8·9, 9; least interorbital breadth 4·1, 4·3; length of palate 8·5, 8·3; postpalatal length 8·9, 8·8; greatest maxillary breadth 6·1, 6·1; median depth of brain-case 4·7, 4·7; length of upper tooth-row 8·8, 8·5.

The skulls are rather smaller than in *jacksoni*, about equal in size to *hildegardæ*. Teeth small, second and third upper unicuspid about equal, heart-shaped in section, the apex of the third pointing slightly inwards and overlapping the internal posterior angle of the second. Last upper molar narrower than in *jacksoni*.

There is only one point in which these three specimens do not agree with the description given by Peters, and that is as regards the relative sizes of the fore and hind claws. Peters states that the fore claws are longer than the hind ones; in the Museum specimens the fore and hind claws are about equal in size. The difference is evidently only a small one, as no measurements are given. An examination of large series of specimens of other species tends to show that there exists a certain amount of variation in the relative sizes of the fore and hind claws; on this account it seems best to accept provisionally these specimens as representing *gracilipes*, it being impossible, owing to the European War, to settle the matter definitely by application to Berlin.

From *jacksoni* this species is distinguished by its smaller narrower skull, smaller unicuspid, less hairy tail, and

browner-coloured upper parts. The dark almost uniformly coloured tail separates it externally from the Amala race of *jacksoni*; the almost equal size of the second and third unicuspid distinguish it at once from *lutreola*, in which these teeth are as unequal in size as in the *fumosa* group.

(93) *Crocidura lutreola*, Hell.

Crocidura lutreola, Heller, Smith. Misc. Coll. vol. lx. no. 12, p. 8 (1912).

Closely allied to *jacksoni*; in colour very like *j. amalæ*, but with darker, not distinctly bicolor tail, and having the third upper unicuspid almost twice the size of the second, in this respect agreeing with some members of the *fumosa* group.

Size of body and hind foot about as in *jacksoni*.

Colour of dorsal surface seal-brown ("sepia"), flanks equally dark; no grey mottling on the back or flanks. Ventral surface grey washed with brown. Backs of hands and feet brownish. Tail dark seal-brown above, a shade lighter below, but not distinctly bicoloured.

Skull like that of *jacksoni*, but narrower across the maxillary region; second upper unicuspid markedly smaller than third, much more so than in any of the other members of this group, third very broad almost square-shaped in section. In general build the skull is most like that of *gracilipes*, but the brain-case is higher.

Dimensions of the type (as given by Heller):—

Head and body 70 mm.; tail 52; hind foot 12·5.

Skull: condylo-incisive length 19; greatest breadth 8·7; length of upper tooth-row 8.

Hab. Mt. Mbololo, Taita Hills, British East Africa. Altitude 5000 feet.

Type. Adult female. U.S. Nat. Mus. no. 181818.

The only specimen of *lutreola* in the Museum Collection is one from the Tsavo River, the coloration and size of the upper unicuspid are exactly as described by Heller. The dimensions of this Tsavo specimen are as follows:—

Head and body 68 mm.; tail 50; hind foot 13.

Skull: condylo-incisive length 20·7; greatest breadth 9·3; least interorbital breadth 4·3; length of palate 8·8; post-palatal length 9; greatest maxillary breadth 6·2; median depth of brain-case 5; length of upper tooth-row 8·7.

The exceptionally large size of the third upper unicuspid render this species quite distinct from all the allied forms.

[To be continued.]



Dollman, J. G. 1915. "On the African shrews belonging to the genus *Crocidura*." *The Annals and magazine of natural history; zoology, botany, and geology* 16, 357–380.

View This Item Online: <https://www.biodiversitylibrary.org/item/71991>

Permalink: <https://www.biodiversitylibrary.org/partpdf/60718>

Holding Institution

University of Toronto - Gerstein Science Information Centre

Sponsored by

University of Toronto

Copyright & Reuse

Copyright Status: NOT_IN_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.